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Applicant(s):	Beasley, Jr. et al.	
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Art Unit:	1731	
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Title:	LOW DENSITY PAPERBOARD AND TUBE INCORPORATING THE SAME	

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APPEAL BRIEF UNDER 37 CFR § 41.37

This Appeal Brief is filed pursuant to the "Notice of Appeal to the Board of Patent Appeals and Interferences" filed January 23, 2007. Section 3 of this Appeal Brief has been amended to expressly list the appealed claims as requested by the Notice of Non-Compliant Appeal Brief issued June 04, 2007. Sections 3, 5, 6, 7, 9, and 10 have been amended to revise the citations and cure the informalities noted in the Notice of Non-Compliant Appeal brief issued August 16, 2007.

1. ***Real Party in Interest.***

The real party in interest in this appeal is Sonoco Development, Inc., the assignee of the above-referenced patent application.

2. ***Related Appeals and Interferences.***

None.

3. ***Status of Claims.***

Claims 1-22 are pending. Claims 1-4 were rejected under 35 U.S.C. 103(a) as obvious over U.S. Patent No. 5,770,013 to Chance et al. ("Chance") in view of U.S. Patent Nos.

1,765,560 to Clapp ("Clapp") or 5,203,965 to McCowan ("McCowan"). Claims 5-18 were rejected under 35 U.S.C. 103(a) as obvious over Chance in view of the combination of Clapp or McCowan, U.S. Patent No. 5,227,024 to Gomez ("Gomez"), and U.S. Patent No. 5,505,395 to Qiu et al. ("Qiu"). Finally, Claims 19-22 were rejected under 35 U.S.C. 103(a) as obvious over Chance in view of the combination of Clapp or McCowan, Gomez, Qiu, and U.S. Patent No. 6,033,352 to Howard et al. ("Howard").

Applicant notes with appreciation that the prior rejection of Claims 1-2, 4-6, 8 and 13 as being obvious under 35 U.S.C. 103(a) in view of Clapp were withdrawn in the Advisory Action issued January 19, 2007. In withdrawing this rejection, the Advisory Action concluded that "[a]s Applicant argues, one of ordinary skill in the art would have been directed to the smaller particle size wood flour rather than to sawdust." *See* Advisory Action dated January 19, 2007, page 2, paragraph 1.

The above-noted rejections of Claims 1-22 are hereby appealed.

4. ***Status of Amendments.***

All amendments have been entered.

5. ***Summary of Claimed Subject Matter.***

The present application concerns paperboard sheets, paperboard tubes, and processes for making the same. Paperboard is traditionally produced by preparing an aqueous slurry or "stock" that contains cellulose fibers, fillers and additives. The necessary cellulose fiber is generally drawn from waste materials such as recycled newsprint, magazines, scraps from old paperboard tubes, corrugated boxes, and wood waste fillers. *See* Specification, page 2, lines 1-10. Such waste materials are not conventionally useful for making paperboard in their raw form and instead require costly chemical digestion, refining, and/or micronization processes to ensure that useable cellulose fiber is extracted.

In contrast to such conventional papermaking processes, Applicant has surprisingly discovered that a highly useable low-density paperboard product may be produced from a stock solution comprised of cellulose fiber and a quantity of undigested/unrefined wood sawdust. *See*

id. at page 2, lines 24-30; *see also* page 5, lines 18-26. As recited in independent Claim 1, Applicant has invented a paperboard sheet that comprises at least one layer containing cellulose fibers and a sufficient quantity of wood sawdust such that the resulting paperboard sheet contains between 1 and 40 percent wood sawdust by weight. *See id.* at page 3, lines 28-31; page 5, lines 10-18; page 8, lines 5-12; and Table 1. Importantly, at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less than 3175 micrometers. *See id.* at page 5, lines 9-15. Dependent Claims 2, 3, and 4 further recite that the paperboard sheet contain between 1 and 6 percent sawdust by weight, 10 and 20 percent sawdust by weight, and 1 and 30 percent sawdust by weight, respectively. *See id.* at page 5, lines 10-18.

Independent Claim 5 is directed to a multi-layer paperboard sheet comprising at least one relatively low-density paperboard layer of the type recited in independent Claim 1 and further comprising "at least one relatively high-density layer containing cellulose fibers, wherein there is at least a 1% difference in density between the at least one relatively low-density layer and the at least one relatively high-density layer." *Id.* at page 7, lines 1-8; and page 8, lines 6-13; and Table 1. The at least one relatively low-density layer and the at least one relatively high-density layer are joined together to produce a multi-layer paperboard sheet containing "between 1 and 40 percent wood sawdust by weight." *See id.* at page 3, lines 28-31; page 5, lines 10-18; page 8, lines 5-12; and Table 1. Dependent Claims 6, 7, and 8 further recite that the paperboard sheet contain between 1 and 6 percent sawdust by weight, 10 and 20 percent sawdust by weight, and 1 and 30 percent sawdust by weight, respectively. *See id.* at page 5, lines 10-18.

Dependant Claims 9-12 recite novel arrangements for the relatively low and high-density layers of the claimed multi-layer paperboard sheet. Specifically, Claim 9 recites that the multi-layer paperboard sheet comprises at least two relatively low-density layers and at least two relatively high-density layers. *See id.* at page 8, lines 4-14; and Table 1. Claim 10 recites that at least one of the relatively high-density layers is free of sawdust. *See id.* Claim 11 recites that at least one of the relatively high-density layers contain sawdust. *See id.* Claim 12 recites that at least one of the relatively low-density layers contain between 1 and 40 percent sawdust by weight. *See id.* at page 3, lines 28-31; page 5, lines 10-18; page 8, lines 5-12; and Table 1. Dependent Claims 13 recites that the low-density layers and the high-density layers are placed in intimate contact, prior to drying, in order to cause bonding between the layers. *See id.* at page 3,

lines 17-22; page 4, lines 27-30; page 6, lines 5-10; page 8, lines 4-10; and Table 1. Dependent Claim 14 recites that the low-density layers and the high-density layers are adhered together in order to cause bonding between the layers. *See id.* at page 3, lines 17-22; page 4, lines 27-30; page 6, lines 5-10; page 8, lines 4-10; Table 1; and page 12, lines 4-6.

Independent Claim 15 is directed to a paperboard tube comprising a plurality of paperboard plies. At least one of the plies includes at least one layer that contains cellulose fibers and a sufficient quantity of wood sawdust such that the resulting at least one paperboard ply contains between 1 and 40 percent wood sawdust by weight. *See id.* at page 3, lines 28-31; page 5, lines 10-18; page 8, lines 5-12; and Table 1. Once again, as recited in Claims 1 and 5, at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less than 3175 micrometers. *See id.* at page 5, lines 9-15. The plurality of paperboard plies are wound about an axis and adhered together to form the recited paperboard tube. *See id.* at page 5, lines 1-5; and page 7, lines 9-13. Dependent Claims 16, 17, and 18 further recite that the paperboard tube comprise at least one paperboard ply containing between 1 and 6 percent sawdust by weight, 10 and 20 percent sawdust by weight, and 1 and 30 percent sawdust by weight, respectively. *See id.* at page 5, lines 10-18.

Independent Claim 19 is directed to a paperboard tube that is comprised of at least one paperboard ply, rather than the plurality of plies recited by Claim 15. *See id.* at page 3, lines 25-28; page 4, lines 27-30; and page 7, lines 9-13. Claim 19 requires that the at least one paperboard ply include at least one layer containing cellulose fibers and a sufficient quantity of wood sawdust such that the resulting paperboard ply contains between 1 and 40 percent wood sawdust by weight and further requires that at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less than 3175 micrometers. *See id.* at page 3, lines 28-31; page 5, lines 9-18; page 8, lines 5-12; and Table 1. The at least one paperboard ply of Claim 19 is wound about an axis and overlapped on itself and adhered together to form a low-density paperboard tube. *See id.* at page 7, lines 9-13; and page 12, line 30 through page 13, line 8. Dependent Claims 20, 21, and 22 further recite that the paperboard tube comprises at least one paperboard ply containing between 1 and 6 percent sawdust by weight, 10 and 20 percent sawdust by weight, and 1 and 30 percent sawdust by weight, respectively. *See id.* at page 5, lines 10-18.

In summary, independent Claims 1, 5, 15, and 19 are directed to paperboard sheets and tubes comprising a "layer containing cellulose fibers and a sufficient quantity of wood sawdust such that the resulting paperboard sheet contains **between 1 and 40 percent wood sawdust by weight**, wherein **at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less then 3175 micrometers[.]**" As described in detail below, none of the cited references taken alone or combination teach or suggest paperboard tubes or sheets having the recited sawdust concentration and the recited proportion of the sawdust concentration within the claimed particle size limits.

6. ***Grounds of Rejection to be Reviewed on Appeal.***

(1) Claims 1-4 were rejected under 35 U.S.C. 103(a) as obvious over Chance in view of Clapp or McCowan.

(2) Claims 5-18 were rejected under 35 U.S.C. 103(a) as obvious over Chance in view of the combination of Clapp or McCowan, Gomez and Qiu.

(3) Claims 19-22 were rejected under 35 U.S.C. 103(a) as obvious over Chance in view of the combination of Clapp or McCowan, Gomez, Qiu, and Howard.

7. ***Argument.***

1. Rejections under 35 U.S.C. 103 (a) based on Chance in view of Clapp or McCowan:

A. Independent Claim 1

Independent Claim 1 is rejected under U.S.C. 103 (a) based on Chance in view of Clapp or McCowan. Chance is directed to a method for manufacturing high-quality paper without requiring the use of a size press. Chance discloses a method of manufacturing a multi-ply paper comprising short wood fibers in an amount of about 20% to about 25 %, by weight, wherein the short wood fibers comprise about 5-70 % sawdust. Chance additionally discloses that an inner ply of the multi-ply sheet comprises at least 1 % sawdust. Chance, column 8, lines 33-38; *see also* Figure 4. Based upon these disclosures, the Final Office Action suggests that Chance teaches a sawdust concentration for the multi-ply sheet of between 1% and 17.5 %. Assuming

for the sake of argument that Chance actually disclosed a sawdust concentration for the multi-ply sheet of 1-17.5%, Chance still fails to teach or suggest that any portion of its sawdust lies within the claimed particle size limits. As admitted in the Final Office Action dated October 4, 2006, Chance does not disclose the use of sawdust wherein "at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less than 3175 micrometers" as expressly required by independent Claim 1.

Clapp is directed to a method for manufacturing paperboard that is coated on one surface by china clay, blanc fixe, or other similar materials for imparting a smooth satiny finish to the paperboard. Clapp discloses that its paperboard includes a bottom layer of a suitable paper stock and a top layer of 5 to 20 parts bleached sulphite pulp, 10 to 20 parts wood flour, 10 to 20 parts cellite, 50 to 70 parts china clay, 10 parts silicate of soda, and 5 parts alum. Clapp, page 1, line 88 to Page 2, line 13. Clapp discloses that its wood flour may be substituted for "finely divided sawdust capable of passing through a 40 to 80 mesh sieve", however, Clapp goes on to state that resulting paperboard is "not quite as satisfactory when the finely-divided sawdust is used as when the wood flour is used." *Id* at. page 2, lines 71-79. The Final Office Action asserts that use of a 40 to 80 mesh sieve would produce sawdust particles of up to 420 μm.

It is common practice in the chemical arts to use a two number mesh size convention when describing a particular sieve. The first number is typically set off by a negative sign (-) and indicates the size of particles that will pass through the sieve. The second number is typically set off by a positive sign (+) and indicates the size of particles that are retained by the sieve. *See* Aldrich, Catalog/Handbook of Fine Chemicals, T848 (2003-2004) attached behind page 19 of the Evidence Appendix. Approximately 90 % of the particles sifted through such conventional sieves lie within the stated range. For example, a -4 to +40 sieve suggests that 90% or more of the sifted material would pass through a 4 mesh sieve (particles smaller than 4.76 mm) and be retained by a 40 mesh sieve (particles larger than 420 μm). *Id.* Clapp discloses a "40 to 80 mesh sieve" and, despite omitting the customary positive (+) and negative (-) signs, appears to suggest that 90 percent of the "finely divided sawdust" would pass through a 40 mesh sieve (420 μm) and be retained by an 80 mesh sieve (177 μm). *See* Clapp at page 2, lines 71-79. This range is illustrated relative to the claimed sawdust particle size range in Figure A below.

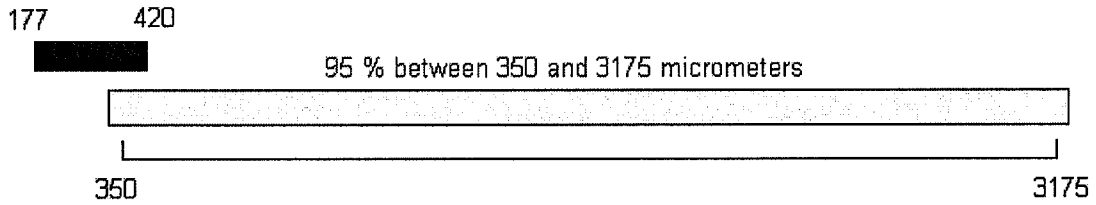

Figure A

The Final Office Action suggests that "it would have been obvious to a person skilled in the art at the time of the invention to use sawdust with at least 95 % of the particles having a size between 350 to 420 μm with a reasonable expectation of success in producing an acceptable paperboard." Final Office Action, dated October 4, 2006, p. 2. Emphasis added. Applicant respectfully disagrees. There is no disclosure, teaching or suggestion in Clapp that would direct one of skill in the art to adopt a particle size between 350 to 420 μm. Indeed, the lower limit of this range is drawn from the present specification and is not found anywhere within the disclosure provided by Clapp.

Notably, Clapp does disclose, however, that paper produced from finely divided sawdust is "not quite satisfactory" when compared to paper produced from smaller wood flour particles. *See* Clapp at page 2, lines 76-78. The Final Office Action states that "[t]his revelation does not teach away from using sawdust as an unsatisfactory material, but that the results of using sawdust are not "quite" as satisfactory in the opinion of the inventor." Final Office Action, page 7. Applicant agrees with this statement as it is precisely Applicant's point. Applicant did not assert in its prior Amendments and Official Action Responses, and does not assert here, that Clapp teaches away from the using sawdust as component of its paper pulp. Instead, Applicant respectfully submits that Clapp teaches away from adopting a composition of sawdust wherein the claimed percentage of sawdust is within the claimed particle size range. More specifically, Applicant respectfully submits that if one of ordinary skill in the art were to produce a paper carrier web from Clapp's less desired material, i.e., sawdust, such an artisan would be taught by Clapp to adopt a sawdust particle size distribution that is focused predominantly toward the disclosed lower limit of 177 μm to more closely approximate Clapp's more desired material, i.e., wood flour. There is no teaching or suggestion within Clapp that would cause one of ordinary skill in the art to select a larger (i.e., less desirable) sawdust particle size distribution that is

heavily focused toward its upper limit of 420 μm as alleged in the Final Office Action (i.e., at least 95 % of the particles having a size between 350 to 420 μm).

For at least the reasons set forth above, Clapp does not teach or suggest a paperboard product having a quantity of sawdust wherein "at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less than 3175 micrometers" as expressly required by independent Claims 1. Notably, in withdrawing a prior obviousness rejection of Claim 1 over Clapp, the Examiner agreed that one of ordinary skill in the art who reviewed Clapp "would have been directed to the smaller particle size wood flour rather than to sawdust." *See* Advisory Action dated January 19, 2007, page 2, paragraph 1.

McCowan is directed to a method for manufacturing tissue and writing paper from a pulp containing a proportion of sawdust. McCowan discloses that its sawdust is sifted through No. 12 to No. 3 sized screens. This sifting is said to remove sawdust "fines" and "flour" and to isolate sawdust particles sized between $^{1}/_{16}$ inch and ¼ inch, respectively (i.e., between 1587.5 and 6350 μm). This range is illustrated relative to the claimed sawdust particle size range in Figure B below.

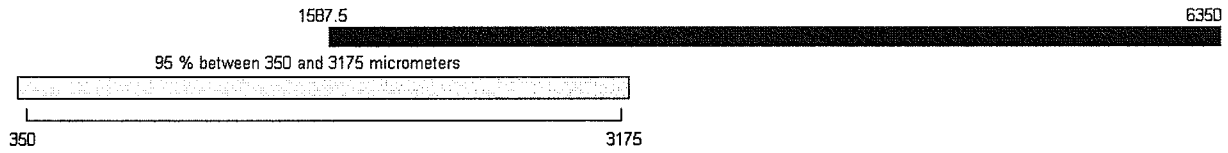

Figure B

McCowan discloses that sawdust particles of this size may donate fibers acceptable for papermaking and that "expectations now are that some tissue paper can be made with screened sawdust exclusively (i.e., no chip pulp)." McCowan, column 5, lines 9-11. The Final Office Action suggests that "it would have been obvious to a person skilled in the art at the time of the invention to use sawdust with at least 95 % of the particles having a size between 1590 and 3175 μm" in the paperboard of Chance in view of McCowan to obtain good strength and formation properties. Final Office Action, pgs. 3-4. Emphasis added. Applicant respectfully disagrees.

McCowan is concerned with the problem of digesting sawdust to extract cellulose fibers of a sufficiently long length to produce tissue paper having an acceptable total strength factor (TSF). As noted in the McCowan specification, it is "the length of the wood fibers of the pulp

that largely determines the strength of the paper." McCowan, column 1, lines 34-36. McCowan further discloses that "[m]ore importantly, it was learned that the quantity of sawdust 'fines' or 'flour' which also makes up a substantial portion of the sawdust mixture produces a negative strength factor" and, thus, by separating the "fines" and "flour" (i.e., the smaller sawdust particles) the downward trend for the use of sawdust as a paper producing pulp is reversed. *See* McCowan, column 2, lines 36-40 and 62-64. In this regard, McCowan makes it quite clear that larger sawdust particles are preferred and that smaller sawdust particles (i.e., fines or flour) are desirably removed.

Applicant does not assert that McCowan teaches away from using sawdust to make tissue paper but rather that McCowan teaches away from making tissue paper from a composition of sawdust wherein the claimed percentage of sawdust (i.e., at least 95%) is within the claimed particle size range. The Advisory Action issued January 19, 2007 alleges that McCowan is not limited to tissue paper applications and instead merely "exemplifies" tissue and writing paper in its discussion of the disclosed invention, which is alleged to be "directed more generally to the utilization of a greater proportion of sawdust in paper production." Page 2, paragraph 4. The Advisory Action further suggests that, based on McCowan, it would have been obvious for one of ordinary skill in the art to use sawdust in the manufacture of any kind of paper, including paperboard, and further obvious to select a particle size distribution within the claimed range in order to achieve "[a] required strength to match the use of the paper." Page 2, paragraph 5. Applicant respectfully disagrees. Assuming for argument purposes that McCowan taught a broader use of sawdust in papermaking beyond just tissue and writing paper, it would be apparent to one of ordinary skill in the art that paperboard has a higher strength than tissue or writing paper. McCowan teaches that longer wood fibers are preferred to shorter wood fibers when attempting to increase paper strength. Thus, if one of ordinary skill in the art were to apply McCowan to the task of manufacturing relatively high-strength paperboard, such an artisan would be led to adopt a particle size distribution that is heavily focused toward the upper limit of the disclosed range (i.e., 6350 μm). McCowan thus teaches away from adopting a particle size distribution in the manufacture of paperboard that is heavily focused toward the lower end of the disclosed range (i.e., 1587.5 μm).

Whether taken alone or in combination with Chance, McCowan does not teach, suggest, or render obvious a paperboard product having a quantity of sawdust wherein "at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less than 3175 micrometers" as expressly required by independent Claim 1. Indeed, as noted above, combining the teachings of Chance and McCowan would suggest to one of skill in the art that paperboard manufactured using sawdust within the recited particle size limits would not produce the strength necessary for a viable paperboard product.

B. Dependent Claims 2-4

Dependent Claims 2-4 are rejected under U.S.C. 103 (a) based on Chance in view of Clapp or McCowan. Dependent Claims 2-4 contain each of the limitations of independent Claim 1 and, thus, for at least the reasons set forth under Paragraph 7.1.A above, dependent Claims 2-4 are patentable over Chance in view of Clapp or McCowan.

2. Rejections under 35 U.S.C. 103(a) based on Chance in view of Clapp or McCowan, Gomez, and Qiu.

A. Independent Claim 5

Independent Claim 5 is rejected under 35 U.S.C. 103(a) based on Chance in view of Clapp or McCowan, Gomez, and Qiu. Independent Claim 5 is directed to a multi-layer paperboard sheet comprising at least one relatively low-density paperboard layer that includes a quantity of sawdust wherein "at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less than 3175 micrometers" as described above with regard to independent Claim 1. Thus, for at least the reasons set forth under Paragraph 7.1.A above, independent Claim 5 is patentable over Chance in view of Clapp or McCowan.

The Final Office Action cites Gomez for its disclosure of vegetable and wood waste fillers in the manufacture of paper products. Gomez expressly teaches away from the claimed paperboard by disclosing that its low-density filler is comprised of a pulverized vegetable filler or wood waste material wherein "at least 95% by weight of the particles...are less than 150 micrometers in size and at least 80 % by weight of the particles are greater than 10 micrometers in size." Gomez, Abstract, column 4, lines 9-15, and lines 58-66. Accordingly, Applicant

respectfully submits that Gomez does not cure the deficiencies noted above and, thus, does not render independent Claim 5 obvious if combined with the above cited references.

The Final Office Action cites Qiu for its disclosure of multi-ply paperboard tubes having layers of differing densities. While Qiu does disclose that its paper tubes may include layers of differing densities, the Qiu reference does not teach or suggest that such differing densities are attributable to the use of sawdust within a low-density paperboard layer. Instead, Qiu only generally notes that "[p]aperboard strength and density are typically varied by varying pulp treatments, degree of nip compression and raw materials, and can also be changed by employing various known additives, and strengthening agents during the papermaking process." Qiu, column 6, line 65 to column 7, line 5. Thus, Qiu cannot teach or suggest that "at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less then 3175 micrometers" as expressly required by independent Claim 5.

For at least the reasons set forth above, it is respectfully submitted that independent Claim 5 is patentable over the cited references taken alone or in combination.

B. Dependent Claims 6-14

Dependent Claims 6-14 are rejected under 35 U.S.C. 103(a) based on Chance in view of Clapp or McCowan, Gomez, and Qiu. Dependent Claims 6-14 contain each of the limitations of independent Claim 5 and, thus, for at least the reasons set forth under Paragraph 7.2.A above, dependent Claims 6-14 are patentable over Chance in view of Clapp or McCowan, Gomez, and Qiu.

C. Independent Claim 15

Independent Claim 15 is rejected under 35 U.S.C. 103(a) based on Chance in view of Clapp or McCowan, Gomez, and Qiu. Independent Claim 15 is directed to a paperboard tube comprised of paperboard plies wherein at least one of the plies includes at least one layer that contains cellulose fibers and a quantity of sawdust wherein "at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less than 3175 micrometers" as described above with regard to independent Claim 1. Thus, for at least the reasons set forth under Paragraph 7.1.A above, independent Claim 15 is patentable over Chance in view of Clapp

or McCowan. Gomez and Qiu do not cure this deficiency for at least the reasons set forth under Paragraph 7.2.A above and, thus, Applicant respectfully submits that independent Claim 15 is patentable over Chance in view of Clapp or McCowan, Gomez, and Qiu.

D. Dependent Claims 16-18

Dependent Claims 16-18 are rejected under 35 U.S.C. 103(a) based on Chance in view of Clapp or McCowan, Gomez, and Qiu. Dependent Claims 16-18 contain each of the limitations of independent Claim 15 and, thus, for at least the reasons set forth under Paragraph 7.2.C above, Applicant respectfully submits that dependent Claims 6-14 are patentable over Chance in view of Clapp or McCowan, Gomez, and Qiu.

3. Rejections under 35 U.S.C. 103(a) based on Chance in view of McCowan, Gomez, Qiu, and Howard.

A. Independent Claim 19

Independent Claim 19 is rejected under 35 U.S.C. 103(a) based on Chance in view of Clapp or McCowan, Gomez, Qiu, and Howard. Independent Claim 19 is directed to a paperboard tube comprised of a paperboard ply having at least one layer containing cellulose fibers and a quantity of sawdust wherein "at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less than 3175 micrometers" as described above with regard to independent Claim 1. Thus, for at least the reasons set forth under Paragraph 7.1.A above, independent Claim 19 is patentable over Chance in view of Clapp or McCowan. Gomez and Qiu do not cure this deficiency for at least the reasons set forth under Paragraph 7.2.A above and, thus, independent Claim 19 is patentable over Chance in view of Clapp or McCowan, Gomez, and Qiu.

Claim 19 recites that its "paperboard ply is wound about an axis and overlapped on itself and adhered together to form a low-density paperboard tube." Howard is directed to a method and apparatus for enhancing spiral seam uniformity within a spirally wound multiply paperboard tube. Howard, column 3, lines 35-40. Howard discloses that the outermost or "final" ply of its multiply tube may be "applied to the tube with the formation of highly precise and predetermined spiral seam having essentially no visible gap, if desired, or having a uniform

predetermined gap, or having a uniform overlapped seam." *Id.* at column 4, lines 35-44. The Final Office Action relies on Howard's disclosure of spiral winding, in combination with Chance, Clapp, McCowan, Gomez, and Qiu, in order to reject independent Claim 19. Applicant respectfully submits that the Final Office Action's conclusion that independent Claim 19 is obvious in view of the combination of the above five references is impermissibly based on hindsight. There is no implicit or explicit motivation, outside of Applicant's present disclosure, to combine this vast array of references. However, as discussed in detail above, even if all six of the above references were improperly combined they still would not teach or suggest every element of independent Claim 19. More specifically, none of the references, taken alone or in combination, teach or suggest a paperboard product having at least one layer containing cellulose fibers and a quantity of sawdust wherein at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less than 3175 micrometers.

B. Dependent Claim 19-22

Dependent Claims 19-22 are rejected under 35 U.S.C. 103(a) based on Chance in view of Clapp or McCowan, Gomez, Qiu, and Howard. Dependent Claims 19-22 contain each of the limitations of independent Claim 19 and, thus, for at least the reasons set forth under Paragraph 7.3.A above, dependent Claims 19-22 are patentable over Chance in view of Clapp or McCowan, Gomez, Qiu, and Howard.

8. ***Claims Appendix.***

An appendix containing a copy of the claims involved in the appeal is attached at page fifteen of this paper.

9. ***Evidence Appendix.***

An appendix containing an excerpted portion of the Catalog/Handbook of Fine Chemicals written by Aldrich is attached behind page 19 of this paper to better illustrate the teaching of the Clapp reference discussed in Section 7.1.A above.

10. ***Related Proceedings Appendix.***

None.

CONCLUSION

In light of the remarks presented herein, Applicant submits that Claims 1-22 are patentable and the rejections should be reversed.

Respectfully submitted,

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APPENDIX – CLAIMS ON APPEAL

1. (Rejected) A paperboard sheet comprising:

at least one layer containing cellulose fibers and a sufficient quantity of wood sawdust such that the resulting paperboard sheet contains between 1 and 40 percent wood sawdust by weight, wherein at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less then 3175 micrometers.

2. (Rejected) A paperboard sheet as recited in Claim 1, wherein said at least one layer contains a sufficient quantity of wood sawdust such that the resulting paperboard sheet contains between 1 and 6 percent sawdust by weight.

3. (Rejected) A paperboard sheet as recited in Claim 1, wherein said at least one layer contains a sufficient quantity of wood sawdust such that the resulting paperboard sheet contains between 10 and 20 percent sawdust by weight.

4. (Rejected) A paperboard sheet as recited in Claim 1, wherein said at least one layer contains a sufficient quantity of wood sawdust such that the resulting paperboard sheet contains between 1 and 30 percent sawdust by weight.

5. (Rejected) A multi-layer paperboard sheet comprising:

at least one relatively low-density paperboard layer containing cellulose fibers and a quantity of wood sawdust, wherein at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less then 3175 micrometers;

at least one relatively high-density layer containing cellulose fibers, wherein there is at least a 1% difference in density between the at least one relatively low-density layer and the at least one relatively high-density layer; and

wherein the at least one relatively low-density layer and the at least one relatively high density layer are joined together producing a multi-layer paperboard sheet, and wherein the resulting paperboard sheet contains between 1 and 40 percent wood sawdust by weight.

6. (Rejected) A multi-layer paperboard sheet as recited in Claim 5, wherein said at least one relatively low-density layer and said at least one relatively high-density layer combine to contain a sufficient quantity of wood sawdust such that the resulting paperboard sheet contains between 1 and 6 percent sawdust by weight.

7. (Rejected) A multi-layer paperboard sheet as recited in Claim 5, wherein said at least one relatively low-density layer and said at least one relatively high-density layer combine to contain a sufficient quantity of wood sawdust such that the resulting paperboard sheet contains between 10 and 20 percent sawdust by weight.

8. (Rejected) A multi-layer paperboard sheet as recited in Claim 5, wherein said at least one relatively low-density layer and said at least one relatively high-density layer combine to contain a sufficient quantity of wood sawdust such that the resulting paperboard sheet contains between 1 and 30 percent sawdust by weight.

9. (Rejected) A multi-layer paperboard sheet as recited in Claim 5, having at least two relatively low-density layers sandwiched between two relatively high-density layers.

10. (Rejected) A multi-layer paperboard sheet as recited in Claim 5, having at least one relatively high-density layer that is free of sawdust.

11. (Rejected) A multi-layer paperboard sheet as recited in Claim 5, having at least one relatively high-density layer that contains sawdust.

12. (Rejected) A multi-layer paperboard sheet as recited in Claim 5, having at least one relatively low-density layer that contains between 1 and 40 percent sawdust by weight.

13. (Rejected) A multi-layer paperboard sheet as recited in Claim 5, wherein the relatively low-density and the relatively high-density layers are placed in intimate contact, prior to drying, in order to cause bonding between fibers, thereby joining the layers and producing a

multi-layer paperboard sheet.

14. (Rejected) A multi-layer paperboard sheet as recited in Claim 5, wherein the relatively low-density and relatively high-density layers are adhered together, thereby producing a multi-layer paperboard sheet.

15. (Rejected) A paperboard tube comprised of a plurality of paperboard plies, wherein

at least one of the plies has at least one layer that contains cellulose fibers and a sufficient quantity of wood sawdust such that the resulting at least one paperboard ply contains between 1 and 40 percent wood sawdust by weight, wherein at least 95 percent of the sawdust by weight has a particle size greater than 350 micrometers and less then 3175 micrometers; and

wherein said plurality of paperboard plies are wound about an axis and adhered together to form a paperboard tube.

16. (Rejected) A paperboard tube as recited in Claim 15, wherein said at least one layer contains cellulose fibers and a sufficient quantity of wood sawdust such that the resulting at least one paperboard ply contains between 1 and 6 percent sawdust by weight.

17. (Rejected) A paperboard tube as recited in Claim 15, wherein said at least one layer contains cellulose fibers and a sufficient quantity of wood sawdust such that the resulting at least one paperboard ply contains between 10 and 20 percent sawdust by weight.

18. (Rejected) A paperboard tube as recited in Claim 15, wherein at said at least one layer contains cellulose fibers and a sufficient quantity of wood sawdust such that the resulting at least one paperboard ply contains between 1 and 30 percent sawdust by weight.

19. (Rejected) A paperboard tube comprised of:

a paperboard ply having at least one layer containing cellulose fibers and a sufficient quantity of wood sawdust such that the resulting paperboard ply contains between 1 and 40 percent wood sawdust by weight, wherein at least 95 percent of the sawdust by weight has a

particle size greater than 350 micrometers and less then 3175 micrometers; and

wherein the paperboard ply is wound about an axis and overlapped on itself and adhered together to form a low-density paperboard tube.

20. (Rejected) A paperboard tube as recited in Claim 19, wherein the at least one layer contains a sufficient quantity of wood sawdust such that the resulting paperboard ply contains between 1 and 6 percent sawdust by weight.

21. (Rejected) A paperboard tube as recited in Claim 19, wherein the at least one layer contains a sufficient quantity of wood sawdust such that the resulting paperboard ply contains between 10 and 20 percent sawdust by weight.

22. (Rejected) A paperboard tube as recited in Claim 19, wherein the at least one layer contains a sufficient quantity of wood sawdust such that the resulting paperboard ply contains between 1 and 30 percent sawdust by weight.

EVIDENCE APPENDIX

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Pulp Technology and Treatment for Paper

SECOND EDITION

Revised and Enlarged

James d'A. Clark

"The more one knows about the fundamental nature of a material or a process, the more likely it is that some improvement can be effected."

J.d'A.C.

A PULP & PAPER BOOK

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Table 17.6 *Classifications of TAPPI 1958 Reference Sulfite Pulp with Clark Classifier (26).*

Test no.	*On 12*	*On 30*	*On 50*	*On 100*	*Through 100*
		Percentages in compartments			
1	22.2	40.8	11.0	7.8	18.2
2	22.6	42.4	11.6	8.0	16.4
3	23.8	39.2	10.6	7.6	18.8
4	22.4	39.4	11.2	8.2	18.8
5	25.4	38.2	11.2	7.8	17.2
6	25.4	40.8	11.2	7.8	14.8
7	23.6	39.4	10.2	8.0	18.8
8	24.8	39.0	11.0	8.0	17.2
Average	23.8	39.9	11.0	8.0	17.4
		Fiber lengths in compartments, weighted by length (mm)			
1	3.50	2.70	1.76	1.16	Assumed 0.2 mm
2	3.44	2.63	1.78	1.19	–
3	3.40	2.67	1.77	1.23	–
4	3.59	2.60	1.67	1.14	–
5	3.45	2.75	1.70	–	–
6	3.46	2.79	1.77	1.17	–
Average	3.48	2.68	1.76	1.18	–

Note: Conditions: 10 l/min water flow for 5 min. Specimen diluted to 3333 ml and added uniformly during the initial 20 sec while the flow was stopped.

evident that, because of the varying flexibility, curl, and external fibrillation of fibers, it is not possible to secure very sharp fractions with any practical design of any type of classifier. Accordingly, it does not seem profitable to extend unduly the classification time to secure a little extra sharpness. Although not confirmed, it would be surprising with the extra eddying involved with the Bauer McNett instrument if after 20 minutes the resulting fractions would be sharper with the Clark instrument if the flow were reduced and the running time of the latter were extended to 15 or 20 minutes instead of the 5 minutes used by Anderson in his report. He failed to experiment with a longer time than 5 minutes, using the Clark instrument with its lesser eddy currents, and his failure has led to the unwarranted assumption that the performance of the Bauer McNett instrument is superior. He and others have not realized that the time and conditions (5 min and 10 liters/min for the Clark classifier) were set deliberately so that the two instruments would give substantially the same results, as will be shown later.

A comprehensive study of the Bauer McNett classifier by Levlin (*29*) discussed various aspects of its action. The repeatability of tests by the same operator and instrument is given in Table 17.7 and the reproducibility with different instruments and operators in Table 17.8. He concluded that the Bauer McNett classifier, even with the lesser charge, which would be advantageous, was not suitable for use as an ISO standard. The Clark instrument, having been previously reported upon by Anderson (*28*), was not studied.